

ANNUAL REPORT FOR 2008



Smith Creek Mitigation Site

New Hanover County

Project No. 8.2250109

TIP No. U-92 A/B



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SUMMARY

The following report summarizes the monitoring activities that have occurred in 2008 at the Smith Creek Mitigation Site. The 2008-year represents the fifth year of hydrology and vegetation monitoring following construction. The site must demonstrate success for a minimum of five years or until the site is deemed successful. The site was constructed to serve as mitigation for impacts associated with the construction of U92-A/B for the Smith Creek Parkway.

A tidal gauge was installed at the Bridge Maintenance site in July 2000 and was used as a reference for the Smith Creek, Wastewater Treatment, and County Sites. Tidal data was collected from July 2000 to July 2004. These sites were graded to elevations based on this tidal data.

Hydrologic monitoring utilizes four surface water gauges located on the adjacent County Mitigation Site and a reference gauge located on the Bridge Maintenance Mitigation Site. These gauges monitor the tidal regime to confirm the site's flooding period.

An onsite agency meeting was held in July 2004. At this time, it was agreed to remove the surface water gauge at the Bridge Maintenance Site since there was sufficient past tidal data. The available tidal data for the Bridge Maintenance gauge revealed inundation for 25.6% from February to July (2004). The four surface water gauges at the County Site were compared to the reference gauge. Three of the four surface gauges indicated that the site was inundated 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the gauge data provided, all four surface water gauges satisfied the inundation criteria determined by the reference gauge.

Vegetation monitoring of the baldcypress area revealed an average tree density of 39 trees per acre. This average is below the minimum success criteria of 50 trees per acre. For the marsh grass area, the target species and scale values were 75% and 4.5, respectively. These results are on schedule for the fifth year of monitoring. Due to on-going construction of the Smith Creek Site, it was not planted in its entirety in 2004. The remainder of the site has now been built with planting completed in May 2005.

During the July 2004 onsite agency meeting, it was agreed that NCDOT could propose to remove the four surface water gauges at the County Site if there was successful tidal data during the 2004-monitoring season. During the 2004 annual monitoring meeting on May 5, 2005, it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

NCDOT proposes to discontinue monitoring at the Smith Creek Mitigation Site.

1.0 INTRODUCTION

1.1 Project Description

The Smith Creek Mitigation Site is located in New Hanover County, adjacent to Bridge Maintenance and the U-92B project in Wilmington (Figure 1). Totalling 27.7 acres in size, the site provides tidal swamp forest creation mitigation for a portion of the wetland impacts associated with U-92A/B (Figure 2).

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetation monitoring must be conducted for a minimum of five years or until the site is deemed successful. The following report describes the results of both hydrologic and vegetation monitoring for the 2008-year (the fifth year of monitoring).

1.3 Project History

February 2003	3-Gallon Baldcypress Planted (Phase I)
April 2003	Marsh Grass Planted (Phase I)
February 2004	3-Gallon Baldcypress Planted (Phase II)
April 2004	Marsh Grass Planted (Phase II)
March-November 2004	Hydrology Monitoring (1 yr.)
September 2004	Vegetation Monitoring (1 yr.)
March 2005	3 Gallon Baldcypress Planted (Final)
May 2005	Marsh Grass Planted (Final)
September 2005	Vegetation Monitoring (2 yr.)
August and October 2006	Vegetation Monitoring (3 yr.)
August and October 2007	Vegetation Monitoring (4 yr.)
September 2008	Vegetation Monitoring (5 yr.)
October 2008	Kudzu Treated

Figure 1. Vicinity Map

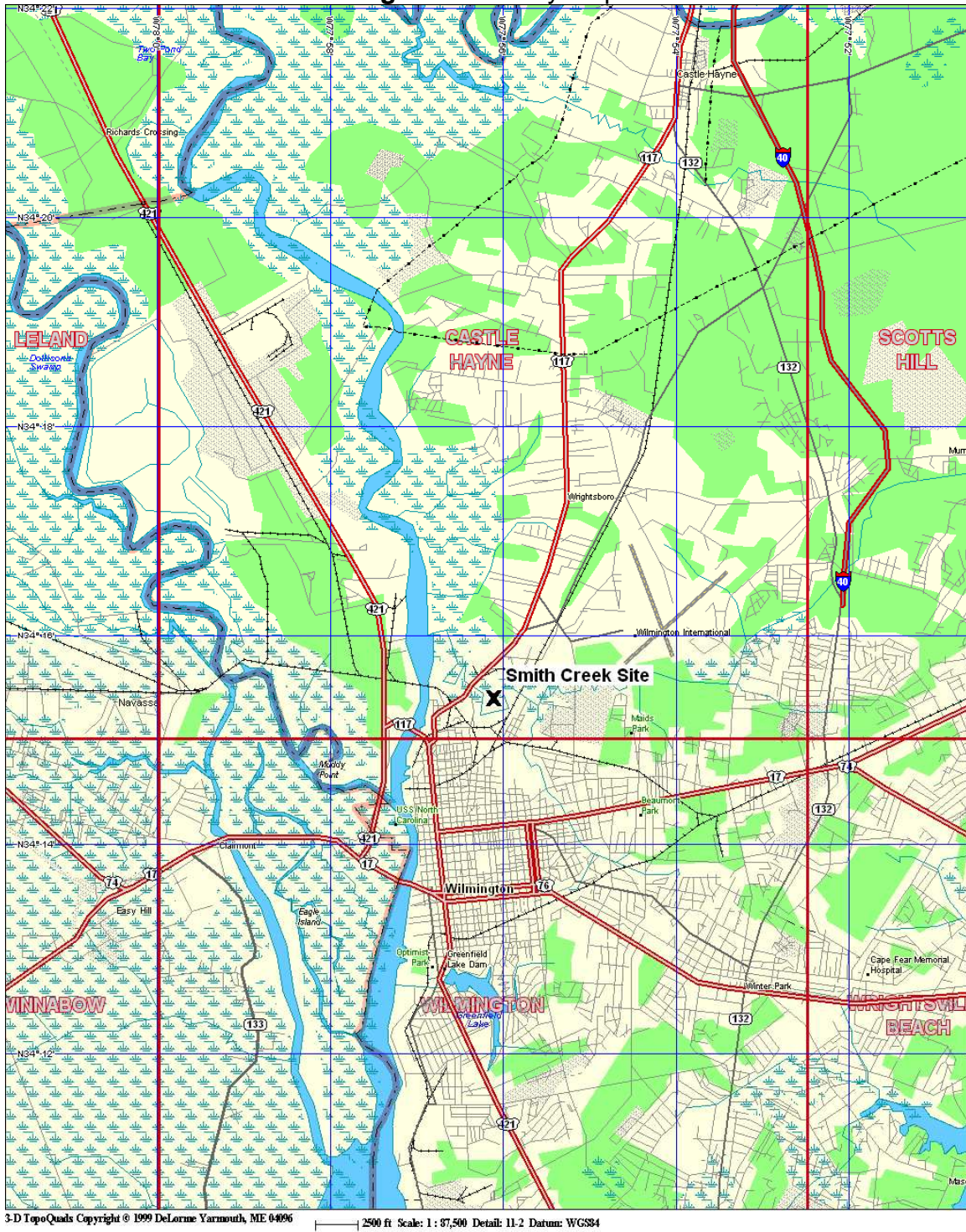
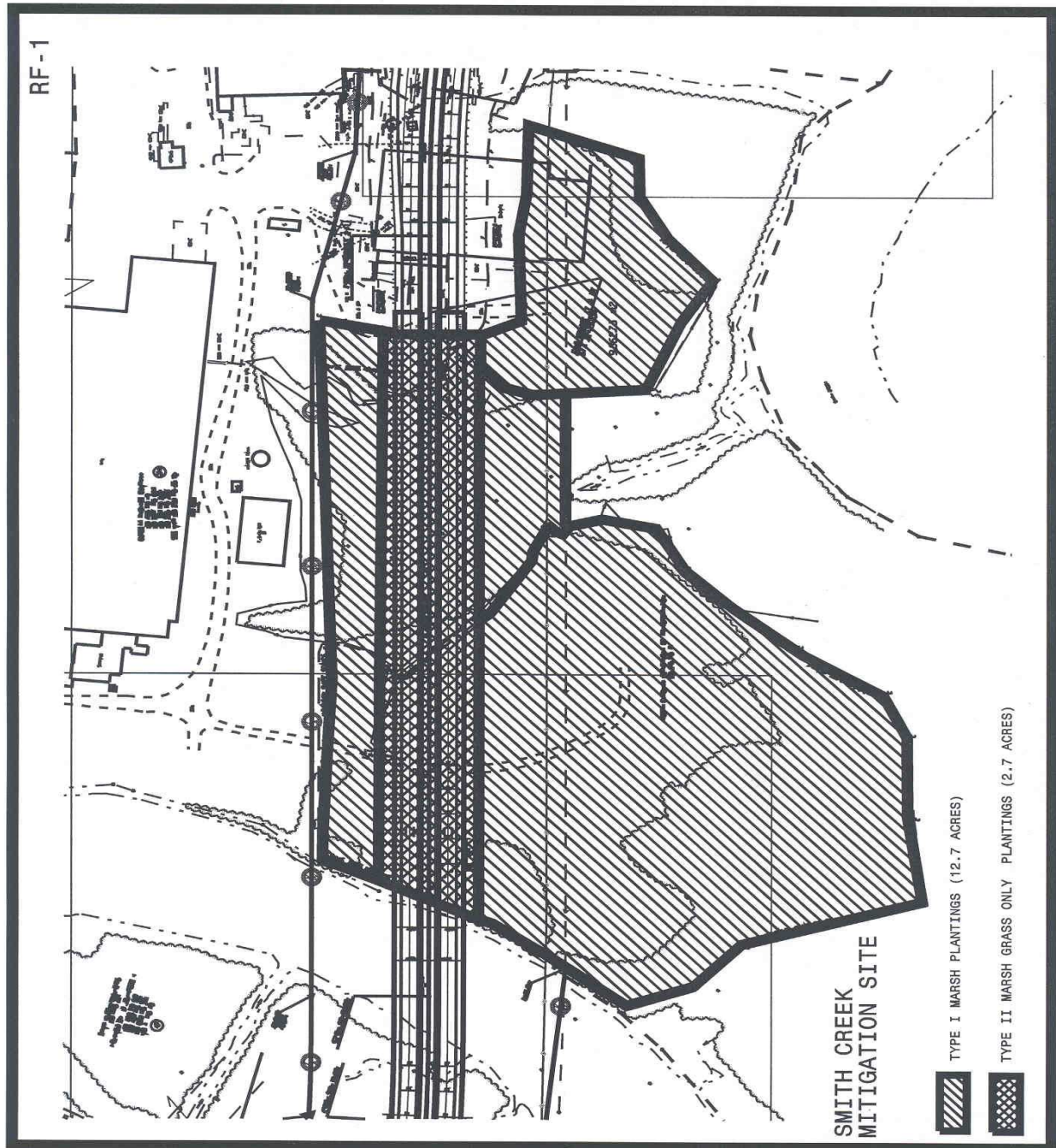


Figure 2. Site Location Map



2.0 HYDROLOGY

2.1 Success Criteria

Hydrology monitoring for the Smith Creek Mitigation Site is conducted at the adjacent County Mitigation Site. Data from an offsite tidal gauge located at the adjacent Bridge Maintenance Site (collected 02-27-04 through 07-14-04) was used as a baseline to estimate the percentage of time that the site should remain flooded, at specific elevations. A target elevation of 2.5 feet above mean sea level was selected for the Smith Creek Mitigation Site. Using the baseline data and the proposed elevation, the Smith Creek Site will be considered hydrologically successful if the adjacent County Site is inundated for 25.6% of the growing season, from February 27 to November 26 (271 days).

2.2 Hydrologic Description

The County Mitigation Site was equipped with four surface water gauges that were installed in December 2003. Since the site is a tide-driven system, groundwater and rain gauges were not installed. During the 2004 annual monitoring meeting on May 5, 2005, it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

2.3 Results of Hydrologic Monitoring

Hydrology monitoring has been discontinued at the County Mitigation Site.

2.4 Conclusions

During the 2004 annual monitoring meeting on May 5, 2005, it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

3.0. VEGETATION: U-92 SMITH CREEK MITIGATION SITE (YEAR 5 MONITORING)

3.1A Success Criteria (Baldcypress Area)

Two 100' x 100' plots have been set and will be counted as part of the vegetation monitoring for the site.

The site will be considered a success for the baldcypress if there are 50 five-year old trees per acre after the end of the fifth growing season....changes in the hydrology of Smith Creek have caused the decline in natural baldcypress populations, and it is uncertain if the planted baldcypress trees will survive. If the baldcypress survivorship declines to below the success criteria, then the Department of Transportation will consult with the Corps of Engineers to determine appropriate action.

Establishment of cypress trees over the restoration area of the Smith Creek Site is proposed, although there is evidence that they may not survive because of increases in salinity, tidal amplitude, and sea level (Hackney and Yelverton, 1990). Consequently, if cypress mortality occurs and the area develops into an emergent marsh community, the vegetational success criteria will be based on emergent marsh vegetation.

3.1B Success Criteria (Marsh Grass Area)

The vegetative marsh success of the wetland site will be determined in accordance with NMFS Guidelines. Monitoring plots found to be located within the open water channel will not be evaluated, and will not count to the final count of plots. The vegetation component of the wetland site will be deemed successful if the following criteria are met.

At year five, the average of all plots should have a scale value of 5 (75% vegetative cover) consisting of wetland herbaceous species, not including any invasive species.

A minimum of 70% of the plots shall contain the target (planted) species.

3.2A & B Description of Planted Areas

The following plant communities were planted throughout the Smith Creek site:

Approximately 15.4 acres

Spartina cynosuroides, Big Cordgrass

Cladium jamaicense, Sawgrass

Taxodium distichum, Baldcypress

3.3A Results of Vegetation Monitoring (Baldcypress Area)

Plot #	Baldcypress (Year 5)	Total (at planting)	Density (trees/acre)
1	8	27	32
2	2	30	7
AVG. DENSITY			39

3.3B Results of Vegetation Monitoring (Marsh Grass Area)

ZONE	Plot #	Scale Factor	<i>S. cynosuroides</i>	<i>C. jamaicense</i>	Frequency	Notes
1	1	5.0				Cattails, 10% Phragmites
	2	3.0	☞		☞	Cattails, 20% Phragmites
	3					Open Water
	4	2.0	☞		☞	Cattails, 80% Phragmites
	5	3.0				Pluchea, 2% Phragmites
	6	1.0				Cattails, 99% Phragmites
	7	5.0	☞	☞	☞	
	8	5.0		☞	☞	
	9	5.0	☞	☞	☞	
	10	5.0	☞		☞	Cattails
	11	5.0	☞		☞	Cattails, 10% Phragmites
	12	5.0	☞	☞	☞	Scirpus sp.
	13	5.0	☞	☞	☞	
	14	5.0		☞	☞	Cattails
	15					Open Water
	16	5.0				Cattails
	17					Open Water
	18	2.0	☞		☞	90% Phragmites
	19	5.0	☞	☞	☞	Cattails, 1% Phragmites
	20	5.0	☞		☞	Cattails, 10% Phragmites
	21					Open Water
	22	5.0	☞		☞	Cattails
	23					Open Water
	24	5.0		☞	☞	Cattails
	25	4.0	☞		☞	Cattails
	26	5.0	☞	☞	☞	2% Phragmites
	27	2.0	☞		☞	Cattails, 70% Phragmites
	28	5.0		☞	☞	Cattails
	29	4.0				
	30	5.0	☞	☞	☞	Cattails
	31	5.0	☞		☞	Cattails
	32	5.0				Cattails
	33	5.0		☞	☞	Cattails, 10% Phragmites
	34					Concrete Pillar from Bridge
	35	5.0	☞		☞	Cattails
	36	3.0				3% Phragmites
	37	5.0				Cattails
	38	5.0	☞	☞	☞	5% Phragmites
	39	5.0		☞	☞	
	40	1.0				Cattails, 99% Phragmites
	41	5.0	☞		☞	5% Phragmites
	42	5.0	☞		☞	Baccharis
	43	5.0	☞		☞	Scirpus sp.
	44	5.0				Cattails, Kudzu

ZONE	Plot #	Scale Factor	<i>S. cynosuroides</i>	<i>C. jamaicense</i>	Frequency	Notes
	45	5.0	☒	☒	☒	1% Phragmites
	46	5.0	☒		☒	Cattails
	47	5.0	☒	☒	☒	
	48	5.0	☒	☒	☒	
	49	5.0	☒		☒	
	50	5.0	☒		☒	Cattails
	51	5.0				Cattails
	52	5.0	☒		☒	
	53	2.0				Scirpus sp., Pluchea, 5% Phragmites
	54	4.0	☒		☒	1% Phragmites
	55					open water
	56	5.0		☒	☒	
	57	5.0	☒	☒	☒	Cattails
	58	5.0	☒	☒	☒	Cattails
	59	5.0	☒		☒	Cattails
	60	5.0				Cattails
	61	5.0	☒	☒	☒	5% Phragmites
	62	3.0	☒		☒	Juncus sp., 5% Phragmites
	63	5.0				Cattails, 5% Phragmites
	64					Open Water
	65	5.0	☒		☒	
	66	4.0	☒	☒	☒	
	67	5.0	☒		☒	Scirpus sp., Cattails
	68					open water
	69	5.0	☒		☒	Juncus sp., Cattails, 1% Phragmites
	70	5.0	☒		☒	Cattails
	71	5.0	☒		☒	Sagittaria
	72					open water
	73	5.0	☒		☒	Cattails, 1% Phragmites
	74					open water
	75					open water
	76	5.0	☒		☒	Cattails
	77	4.0				Scirpus sp., Cattails
	78	4.0	☒		☒	Cattails, Sagittaria
	79	5.0		☒	☒	Cattails
	80	2.0				Scirpus sp.
	81	4.0	☒		☒	Cattails
	82	5.0				Cattails, 1% Phragmites
	83	3.0				Cattails
	84	5.0	☒		☒	5% Phragmites
	85	5.0	☒		☒	1% Phragmites
	86	OW				open water
	87	5.0	☒		☒	Cattails, 5% Phragmites
	88	5.0	☒		☒	Cattails, 5% Phragmites
	89	4.0	☒		☒	Cattails, Scirpus sp.
	90	5.0		☒	☒	

ZONE	Plot #	Scale Factor	<i>S. cynosuroides</i>	<i>C. jamaicense</i>	Frequency	Notes
	91	3.0	→		→	Cattails
	92	5.0	→	→	→	
	93	5.0		→	→	3%Phragmites
	94	5.0		→	→	10%Phragmites
	95	5.0				Cattails
	96					Open Water
	97	4.0				Cattails, 50%Phragmites
	98	5.0	→		→	Cattails, 10%Phragmites
	99	2.0	→		→	70%Phragmites
	100	5.0				Cattails
	101	5.0		→	→	Cattails
	102	3.0				Cattails, 3%Phragmites
	103	0.0				Bare Ground
	104	5.0		→	→	5%Phragmites
	105	5.0	→		→	Cattails
	106	5.0	→	→	→	Cattails
	107	3.0		→	→	Cattails
	108	4.0				Cattails
	109	5.0	→		→	Cattails
	110	5.0	→		→	
	111	0.0				100%Phragmites
	112	5.0	→	→	→	
	113					Open Water
	114	5.0		→	→	
	115	5.0	→		→	Cattails
	116					Open Water
	117	5.0	→		→	
	118	0.0				100%Phragmites
	119	5.0	→		→	Cattails, 3%Phragmites
	120	5.0				Cattails
	121	5.0	→		→	Cattails
	122	5.0				Cattails, Scirpus sp.
	123	4.0		→	→	Cattails, 1%Phragmites
	124	5.0	→	→	→	Cattails
	125	5.0	→	→	→	Cattails
	126	4.0				Cattails
	127	5.0				Cattails
	128	5.0	→	→	→	Cattails
	129	5.0				Cattails
	130	5.0				Cattails, Scirpus sp.
	131	5.0				Cattails, Sagittaria, 5%Phragmites
	132	5.0		→	→	Cattails
	133	5.0		→	→	
	134	4.0				Cattails
	135	5.0	→	→	→	Cattails
	136	5.0				Cattails
	137	5.0	→	→	→	Cattails
	138	5.0		→	→	Cattails
	139	5.0	→	→	→	Cattails
	140	5.0	→	→	→	Cattails

ZONE	Plot #	Scale Factor	<i>S. cynosuroides</i>	<i>C. jamaicense</i>	Frequency	Notes
	141	5.0	→	→	→	
	142	5.0		→	→	Cattails
	143	5.0				Cattails, Scirpus sp.
	144	5.0	→	→	→	Cattails
	145	5.0		→	→	Cattails
	146	5.0	→	→	→	Cattails, Scirpus sp.
	147	5.0	→		→	Cattails
	148	5.0	→	→	→	Cattails, Scirpus sp.
	149	5.0				Cattails
	150					Open Water
	151	5.0	→	→	→	Cattail
	152	5.0	→	→	→	Cattail
	153	5.0				Cattail, Scirpus sp., Pluchea
	154	5.0		→	→	Cattails
	155	5.0	→	→	→	Cattails
	156	5.0	→		→	Cattails
	157	5.0		→	→	Cattails
	158	5.0				Cattails
	159	5.0				Cattails, Scirpus sp.
	160	4.0				Cattails
	161	5.0		→	→	
	162	5.0	→	→	→	
	163	5.0	→		→	Cattails
	164	5.0	→	→	→	Scirpus sp.
	165	5.0		→	→	
	166	5.0		→	→	
	167	5.0	→	→	→	
	168	5.0	→		→	
	169	5.0	→		→	Cattails
	170	5.0		→	→	Cattails
	171	5.0	→		→	Cattails
	172	5.0		→	→	Cattails
	173	5.0	→	→	→	Cattails
	174	5.0		→	→	Cattails
	175	5.0	→		→	Cattails, Scirpus sp.
	176	4.0	→		→	Scirpus sp.
	177	5.0		→	→	Cattails
	178	5.0	→	→	→	
	179	5.0	→	→	→	
	180	5.0		→	→	Cattails
Frequency (Percentage of						
Plots with Desired Species)					75%	
Sum Scale Value					743	
Total Number of Plots Counted					163	
Vegetative Cover (Scale Value)					4.5	

Site Notes: The following species were also noted in the monitoring plots. The number of plots the species were found in is listed in parentheses (i.e. 107 of the plots contain cattails.) cattails (107), phragmites (41), *Sagittaria* sp. (3), *Pluchea* sp. (3), *Scirpus* sp. (17), *Baccharis* sp. (1), Kudzu (1), and *Juncus* sp. (2).

The plots that did not have a planted species (big cordgrass or sawgrass) noted within the meter by meter plot but have a recorded scale factor have the species that were noted within the plot stated in the "NOTES" column. (i.e. Plot #16 did not contain one of the planted species but did contain cattails which gave it enough vegetative cover to have a scale factor of 5).

Since, the 2006 monitoring evaluation photos 4, 5, and 6 had to be taken from down in the site, instead of, on the bridge due to traffic being turned onto the Smith Creek Parkway.

As seen in Photo 7, kudzu is starting to encroach into the site. Division Roadside personnel treated the kudzu in October 2008.

3.4A Conclusions (Baldcypress Area)

Baldcypress trees were planted on 20' centers throughout the approximately 15.4 acre site. Two 100' x 100' plots were established in the planting area. The vegetation monitoring of the planted area revealed an average of 67 baldcypress trees per acre.

3.4B Conclusions (Marsh Grass Area)

- Percent Frequency of Target Species (Big Cordgrass and Sawgrass) **75%**
Frequency of 70% required.
- Vegetative Cover Scale Value **4.5**
Scale Value of 5 required for year 5.

Approximately 15.4 acres of this site involved marsh grass plantings. Due to the construction of the Smith Creek Mitigation Site there were only 120 random plots taking during the first year of monitoring. The final phase of marsh grass plantings was planted in May 2005. All 180 random plots have been taken since the second monitoring year. Based upon the percent frequency and scale value, the marsh grass area is on track for the fifth year of monitoring. NCDOT proposes to discontinue the vegetation monitoring at the Smith Creek Mitigation Site.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

An onsite agency meeting was held in July 2004. At this time, it was agreed to remove the surface water gauge at the Bridge Maintenance Site since there was sufficient past tidal data. The available tidal data for the Bridge Maintenance gauge revealed inundation for 25.6% from February to July (2004). The four surface water gauges at the County Site were compared to the reference gauge. Three of the four surface gauges indicated that the site was inundated 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the gauge data provided, all four surface water gauges satisfied the inundation criteria determined by the reference gauge.

Baldcypress trees were planted on 20' centers throughout the approximately 15.4-acre site. Vegetation monitoring of the baldcypress area revealed an average tree density of 39 trees per acre. This average is below the minimum success criteria of 50 trees per acre. Approximately 15.4-acre of this site involved marsh grass plantings. For the marsh grass area, the target species and scale values were 75% and 4.5, respectively; the marsh grass area is on track for the fifth year of monitoring.

During the 2004 annual monitoring meeting on May 5, 2005, it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

NCDOT proposes to discontinue monitoring at the Smith Creek Mitigation Site.

APPENDIX A
SITE PHOTOS
&
PHOTO AND PLOT LOCATIONS

Smith Creek



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5
September 2008



Photo 6

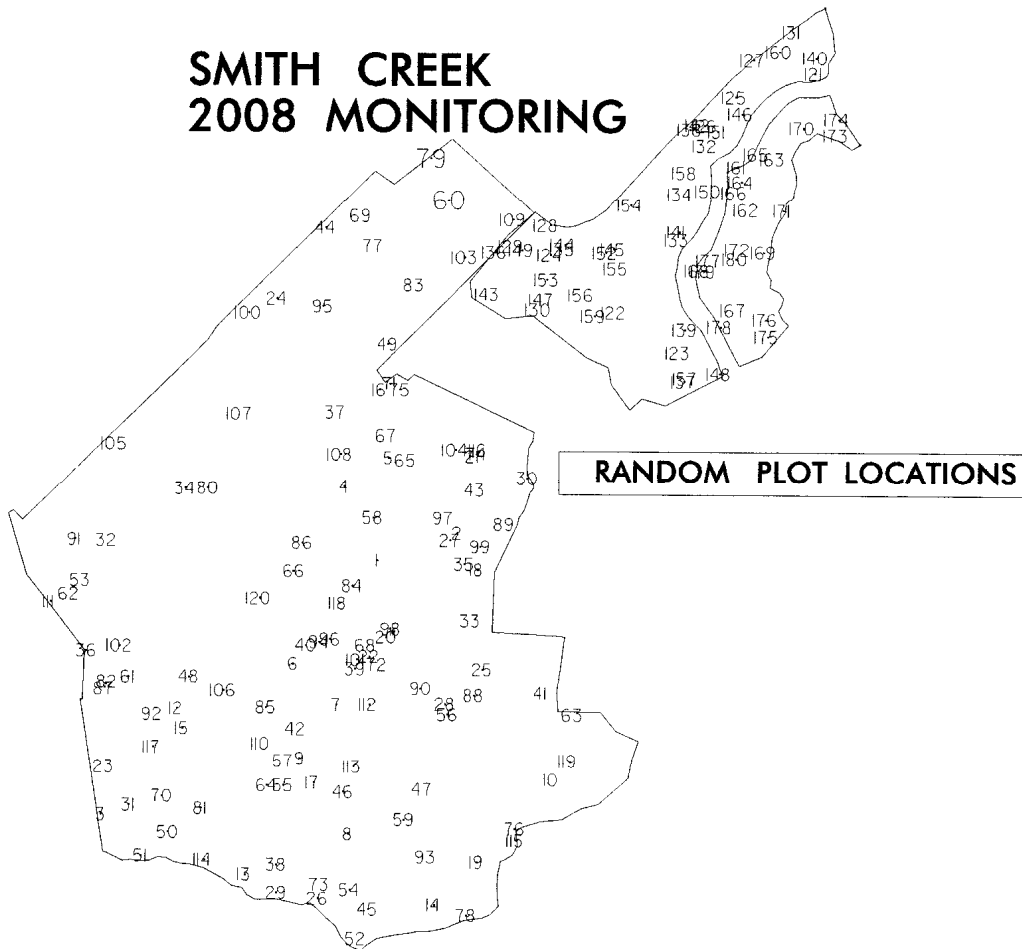
Smith Creek



Photo 7

September 2008

SMITH CREEK 2008 MONITORING



SMITH CREEK MITIGATION SITE

